

Productivity

Biomass → living mass of an organism or organisms

* Sometimes dry mass.

2.5.5 Define the terms gross productivity, net primary productivity, primary productivity, and secondary productivity

→ Productivity: making something per unit area per unit time (meter^2/yr)
rate of growth or biomass increase in plants & animals.

→ primary productivity: (Deals w/ Plants)

↑
Think Primary Producer

typically $\text{kJ m}^{-2} \text{yr}^{-1}$
↑ unit of E ← time
 ↓ area
 OR
 ↓
 $\text{gm}^{-2} \text{yr}^{-1}$

→ secondary productivity: (Deals w/ Animals)

↑
Think Consumers

$$\text{GPP} - R = \text{NPP}$$

glucose made during photosynthesis
2 fates

① growth, maintenance, & Reproduct.

② deposited in & around cells as new material → stored dry mass (Biomass)

→ gross (GPP) & net primary productivity (NPP):

↑
Total gain in E/Biomass per unit area per unit time Made By Photosynthesis
 $\text{kJ m}^{-2} \text{yr}^{-1}$ or $\text{gm}^{-2} \text{yr}^{-1}$

Total gain in E/Biomass after respiration.

↑ Potential food for consumers.

→ gross secondary productivity (GSP): Total gain in E/Biomass per area/time by consumers through absorption.

$\text{kJ m}^{-2} \text{yr}^{-1}$ or $\text{gm}^{-2} \text{yr}^{-1}$

Respiration (loss)

→ net secondary productivity (NSP):

$$\text{GSP} - R = \text{NSP}$$

↓
• Some of what is eaten goes straight through as feces

• The rest

↓

Some absorbed through Gut

→ Nitrogenous waste

→ urine

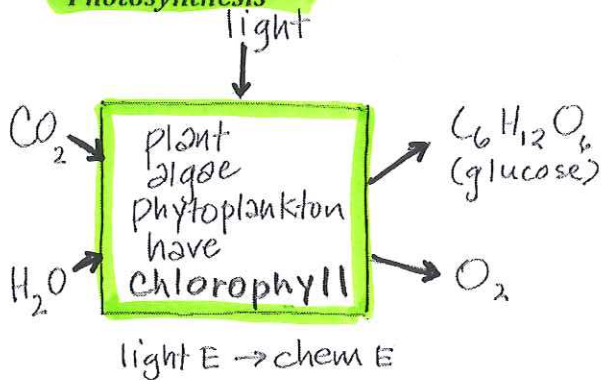
Cell respiration

new tissue

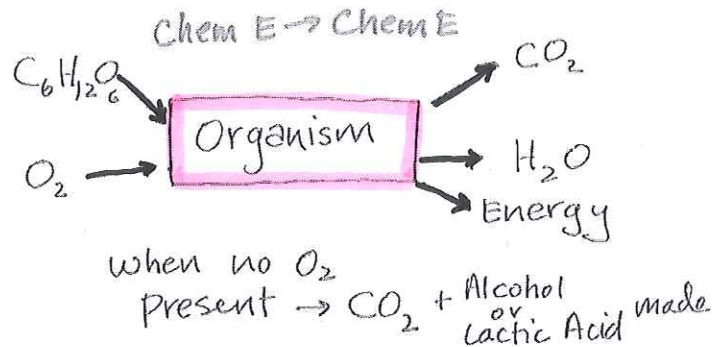
Productivity 2

2.5.2 Describe photosynthesis and respiration in terms of inputs, outputs and energy transformations

Photosynthesis



Cellular Respiration



2.1.4 Explain the principles of pyramids of numbers, pyramids of biomass, and pyramids of productivity, and construct such pyramids from given data.

Show Biomass present @ a specific time

STORAGE OF ENERGY

* Show momentary stock

* gm^{-2} or Jm^{-2}

↑ Show Flow of E through trophic levels

* Show rate at which stock is generated.

* $\text{gm}^{-2}\text{yr}^{-1}$
 $\text{Jm}^{-2}\text{yr}^{-1}$

2.5.6 Define the terms and calculate the values of both gross primary productivity (GPP) and the net primary productivity (NPP) from given data.

$$\text{GPP} - R = \text{NPP}$$

$$500 \text{ Jm}^{-2} \text{ yr}^{-1} - 200 \text{ Jm}^{-2} \text{ yr}^{-1} = 300 \text{ Jm}^{-2} \text{ yr}^{-1}$$

↑
Total E made

↑
E used for respiration

↑
"Profit" E
 \rightarrow goes toward Biomass

2.5.7 Define the terms and calculate the values of both gross secondary productivity (GSP) and net secondary productivity (NSP) from given data.

$$\text{GSP} - R = \text{NSP}$$

$$200 \text{ Jm}^{-2} \text{ yr}^{-1} - 175 \text{ Jm}^{-2} \text{ yr}^{-1} = \text{NSP}$$

$$25 \text{ Jm}^{-2} \text{ yr}^{-1} = \text{NSP}$$

Feces 108 J

↑
Plant material eaten by caterpillar 200 J

↓ 33 J
Growth (Biomass)

→ 67 J
Cell Respiration

* In this case R includes Respiration & Feces

10% rule to determine a bird eating a caterpillar 20 J

10% rule \rightarrow 2000 J was what the plant had